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ORIGINAL RESEARCH

Outcome of Laparoscopic Cholecystectomy in Acute Cholecystitis

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Abstract
Aim: To analyse the outcome of laparoscopic cholecystectomy in acute cholecystitis.
Material and method: The present prospective observational study was conducted in the department of General Surgery for a period of one year, after obtaining ethical clearance from institutional committee. Our study included a total of 150 patients fulfilling exclusion and inclusion criteria and who underwent laparoscopic cholecystectomy. The patient who gave consent, were enrolled only for study. Operation time from onset of procedure (i.e. time since incision was given) to closure of wound, intraoperative finding and intra operative complications were recorded. After surgery postoperative complications and duration of hospital stay was noted. After the patient is discharged they were followed up for post operative findings on day of discharge, day of suture removal and day 14. The findings noted down for the patients were studied and analysed at the end of study according to standard statistical methods and conclusions were made.
Results: Dissection of Calot's Triangle was found to be easy and difficult in 83.33% and 16.67% of the subjects respectively. Intraoperative complications viz. bile duct injury, stone spillage and GB bed bleed was found among 2%, 12.67% and 3.33% of the subjects respectively. Blood loss <50ml, >50ml was reported among 89.33% and 10.67% of the subjects respectively. Mean post-op pain (hours), duration of hospital stay (days) and return to work (days) among the study subjects was 17.08±3.19, 2.01±0.17 and 2.98±0.39 respectively. Post-operative complications viz. wound infection, abdominal infection, postoperative ileus, pulmonary complications and fever was found among 3.33%, 2%, 5.33%, 4% and 4% of the subjects respectively.
Conclusion: Laparoscopic cholecystectomy is an effective and safe technique of treating symptomatic gallstones even in cases of acute cholecystitis because of accelerated recovery coupled with less postoperative pain and short hospital stay & early return to work.
Keywords: Acute Cholecystitis, Laparoscopic Cholecystectomy, Outcome

Introduction

Acute cholecystitis (AC) is one of the most frequent conditions requiring abdominal surgeryin emergencies in elderly people. On the basis of etiopathogenesis, acute cholecystitis is of two types, acute calculous and acute acalculous cholecystitis; 90-95% of cases of acute

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cholecystitis are related to gallstone obstruction of the cystic duct. The pathogenesis of most cases is probably chemical or ischemic rather than infectious. Impaction of a stone in the cystic duct leads to changes in the concentration and composition of bile. Acute acalculous cholecystitis accounts for about 5% of all cases of acute cholecystitis. It usually occurs in critically ill patients, after trauma, burns, long-term parenteral nutrition, major non biliary operations and cardiopulmonary bypass. The cause of acute acalculous cholecystitis remains unclear, although gallbladder stasis and ischemia have been most often implicated as causative factors and right upper quadrant pain is the most common complaint, which is colicky and persists for a long time. Other common symptoms include nausea, vomiting and fever[1-3].

The current guidelines recommend surgery as soon as possible because evidenced-based clinical studies confirmed that early treatment reduces the total hospital stay and does not increase the complication or conversion rates[4,5]. The diagnosis of AC is based on a combination of clinical criteria, laboratory criteria and imaging findings. As per TG18/TG13,[6] the diagnostic criteria for acute cholecystitis includes: A. Local signs of inflammation etc. (1) Murphy's sign, (2) RUQ mass/pain/tenderness, B. Systemic signs of inflammation (1) Fever, (2) elevated CRP, (3) elevated WBC count and C. Imaging findings characteristic of acute cholecystitis(thickened, edematous, distended gallbladder; positive sonographic Murphy's sign; presence of gallstones; and pericholecystic fluid collection).

Suspected diagnosis: one item in A + one item in B

Definite diagnosis: one item in A + one item in B + C

Laparoscopic cholecystectomy has become the "gold standard" due to its undeniable advantages in reducing pain and postoperative complications. Together with the development of anesthesia and intensive care skills and techniques, the safety limit for performing laparoscopy has also increased nowadays nearing the age of 80–85 years[7].

The first laparoscopic cholecystectomy was performed in 1985 by Muhe. Reddick and Oslen however devised the currently used method for laparoscopic cholecystectomy, performing their first case in September 1988. Laparoscopic cholecystectomy achieves the goals of shorter recovery time, decreased expense, less postoperative pain and improved cosmesis. In the early years of minimally invasive surgery acute cholecystitis was considered to be contraindication to laparoscopic cholecystectomy because of inflammatory changes[8].

Laparoscopic cholecystectomy is more likely to be successful and complication-free if it is performed within 72 hours of presentation. Acute cholecystitis is the acute inflammation of the gallbladder which, in 90-95% of patients, is due to obstruction of the cystic duct by a gallstone. The combination of cystic duct occlusion and altered biliary lipid composition appears to initiate the cascade of events which culminate in the mucosal release of inflammatory agents from the gallbladder. Although bacteria are cultured in approximately 50% of patients, these organisms generally are thought to play a secondary role in the pathogenesis of cholecystitis[9-11].

Although early laparoscopic cholecystectomy is being performed with good results in some higher centers in Western countries, enough data is not available in the Indian scenario. In our institution, we have experienced surgeons who routinely perform laparoscopic cholecystectomy in acute cholecystitis. Hence, we have conducted this study where the outcome of laparoscopic cholecystectomy in acute cholecystitis was discussed and a conclusion was drawn.

Material and method

The present prospective observational study was conducted in the department of General Surgery for a period of one year, after obtaining ethical clearance from institutional committee. Our study included a total of 150 patients fulfilling exclusion and inclusion

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criteria and who underwent laparoscopic cholecystectomy. The patient who gave consent, were enrolled only for study.

Inclusion Criteria

1. Age Group - 20 years to 70 years.
2. ASA CLASS – I, II, III.

Exclusion Criteria

1. Patients having clinical, biochemical or ultrasonographic features suggestive of CBD stones.
2. Patients having coagulation disorders.

Methodology

a. In all cases, history, general physical examination, results of lab investigations, ultrasound findings were noted down from the patient's case sheet as per the proforma attached.
b. Operation time from onset of procedure (i.e. time since incision was given) to closure of wound, intraoperative finding and intra operative complications were recorded.
c. After surgery postoperative complications and duration of hospital stay was noted.
d. After the patient is discharged they were followed up for post operative findings on day of discharge, day of suture removal and day 14.
e. The findings noted down for the patients were studied and analysed at the end of study according to standard statistical methods and conclusions were made.

Operative Technique

All patients were asked to void before surgery. The patients were given general anaesthesia and placed in the supine position on the operating table. An orogastric tube was inserted to decompress the stomach. The abdominal skin was prepared and towelled and a pneumoperitoneum was established by blind puncture using a Veress needle through a small incision 1 cm in length below the umbilicus with the patient in 15°-Trendelenburg position. The anterior abdominal wall was elevated during needle insertion. Confirmation of the intraperitoneal location of the needle was made by the saline drop test; the peritoneal cavity was insufflated using carbon dioxide. The usual preset intraabdominal pressure used was 11 mm Hg with a flow rate of 2.1 litres per minute. The initial amount of gas used for insufflation was 1.2-1.5 litres.

Primary port placement: While elevating the abdominal wallmanually, a 10mm canula was inserted through the incision used for the Veress needle. The telescope was placed through the primary canula and peritoneoscopy was performed. The patient was placed in a reverse Trendelenburg position and the table tilted to the left to allow a clear view of the gallbladder area.

Secondary port placement: An epigastric 10 mm port wasp laced in the midline entering the peritoneal cavity again under direct vision to the right of the falci form ligament and a 5mm port was placed under direct vision in the midclavicular line just below the right costal margin. A fourth port was inserted in the anterior axillary line just below the costal margin. Instruments used to perform the dissection were passed through the epigastric port.

Dissection was begun high in the neck of the gallbladder and was kept close to the gallbladder until the anatomy was well defined. A clear view of the cystic duct was obtained before the application of the clips, which were placed as close to the gallbladder as possible under direct vision. When a short cystic duct was present, an endoloop or ligature was used around the cystic duct instead of a clip. Following division of the cystic artery, the cystic duct

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was divided between clips. The gallbladder was dissected off the liver bed using monopolar cautery and dissection was started behind Hartmann's pouch. The gallbladder was not completely removed from its liver bed and by leaving the fundus attached, the liver was elevated and the gallbladder fossa was carefully inspected for accessory bile ducts and bleeding. Using irrigation and suction the liver bed was closely scrutinized and dealt with as necessary. The cystic artery and cystic duct were also inspected at this stage to ensure that the clips were in position. A large grasping forceps was inserted through the epigastric port, to hold the neck of the gallbladder which was then extracted. If stones were large, they were crushed within the gallbladder.

After removal of the gallbladder, the bed was inspected once again. In case of excessive oozing, a haemostatic agent (Surgicel®) was spread over the bed. In case of bleeding orbile spillage, a suction drain was passed into the peritoneal cavity through the 5mm port and placed under the liver over the gallbladder fossa. The ports were removed under vision. The table was straightened and the gas was expelled from the peritoneal cavity. The skin incisions were closed by 2-0 silk sutures. These incisions were injected subcutaneously with 0.5 percent bupivacaine.

Postoperatively intravenous fluids were continued up to 8 hours after surgery and antibiotics till next day morning. Data was collected and subjected to statistical analysis.

Statistical analysis

Data so collected was tabulated in an excel sheet, under the guidance of statistician. The means and standard deviations of the measurements per group were used for statistical analysis (SPSS 22.00 for windows; SPSS inc, Chicago, USA).

Results

Females (78.67%) were comparatively more as compared to males (21.33%) in the present study. Maximum subjects were from the age group of 31-40 years followed by 41-50 years. Most common symptom was pain followed by nausea/vomiting, dyspepsia and postprandial fullness among the study subjects. Least common symptom among the study subjects was heartburn followed by fever in this study (graph 1). Tenderness and lump was reported among 66% and 8.67% of the subjects respectively.

GRAPH 1: Symptoms among the study subjects

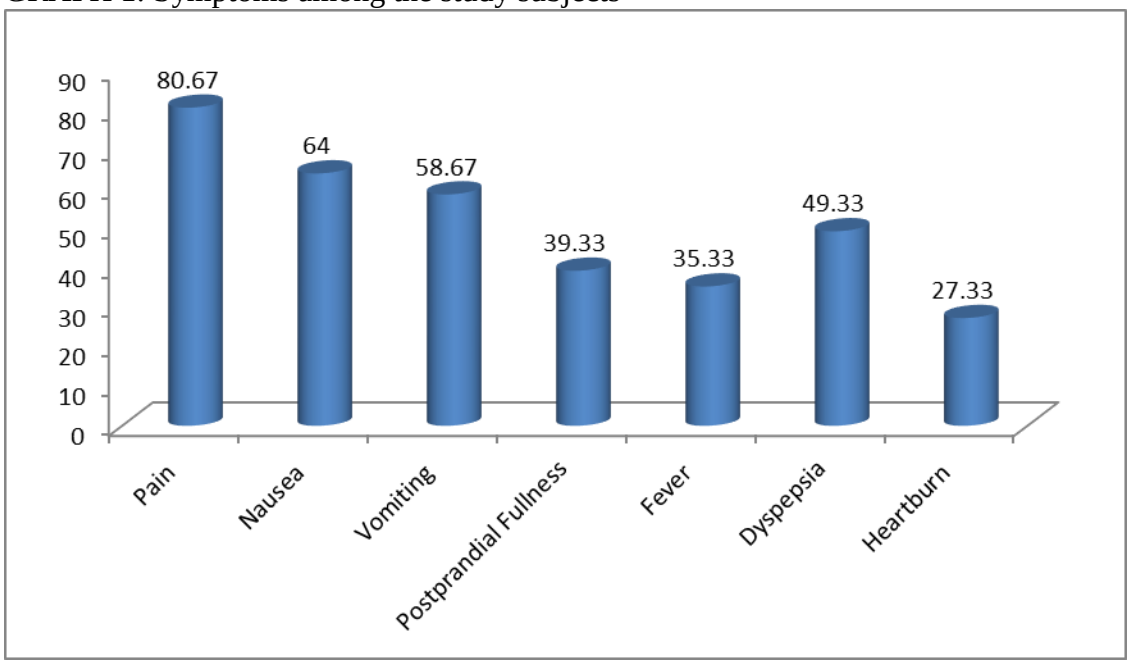

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Table 1 shows the USG findings among the study subjects. Single and multiple stones were found in 74.67% and 25.33% of the subjects respectively. Distended GB with USG Murphy's sign and edema of the gallbladder was reported among all the subjects. Pericholecystic fluid, mucocele and empyema GB was revealed among 24.67%, 9.33% and 10.67% of the subjects respectively.

Table 1: USG findings among the study subjects

Findings	Laparoscopic Cholecystectomy	
	N	%
Edema of the gallbladder with wall thickness >4 mm	150	100
Distended GB with USG Murphy's sign	150	100
Pericholecystic Fluid	37	24.67
Mucocele	14	9.33
Empyema GB	16	10.67
Single Stone	112	74.67
Multiple Stone	38	25.33

Adhesion at Calot's Triangle, distended GB and edematous/thickened wall status was found in all the subjects. Dissection of Calot's Triangle was found to be easy and difficult in 83.33% and 16.67% of the subjects respectively. Mucocele, empyema and gangrenous GB was reported in 9.33%, 10.67% and 3.33% of the subjects respectively. Critical view of safety was found in 94.67% and 5.33% of the subjects respectively. Gall bladder perforation, bilioenteric fistula and liver cirrhosis was not revealed in any of the subject (table 2).

Table 2: Intraoperative findings among the study subjects

Findings	Laparoscopic Cholecystectomy	
	N	%
Adhesion at Calot's Triangle	25	16.67
Distended GB	150	100
Wall status: Edematous/Thickened	150	100
Dissection of Calot's Triangle		
Easy	125	83.33
Difficult	25	16.67
Mucocele	14	9.33
Empyema	16	10.67
Gangrene	5	3.33
Gall Bladder Perforation	0	0
Bilioenteric Fistula	0	0
Liver Cirrhosis	0	0
Critical View of Safety		
Achieved	142	94.67
Not Achieved	8	5.33

Bile duct injury, stone spillage and GB bed bleed was found among 2%, 12.67% and 3.33% of the subjects respectively. Out of three subjects with bile injury, one was repaired and other 2 subjects have to undergo open cholecystectomy. Bowel injury was not found in any of the subject (graph 2).

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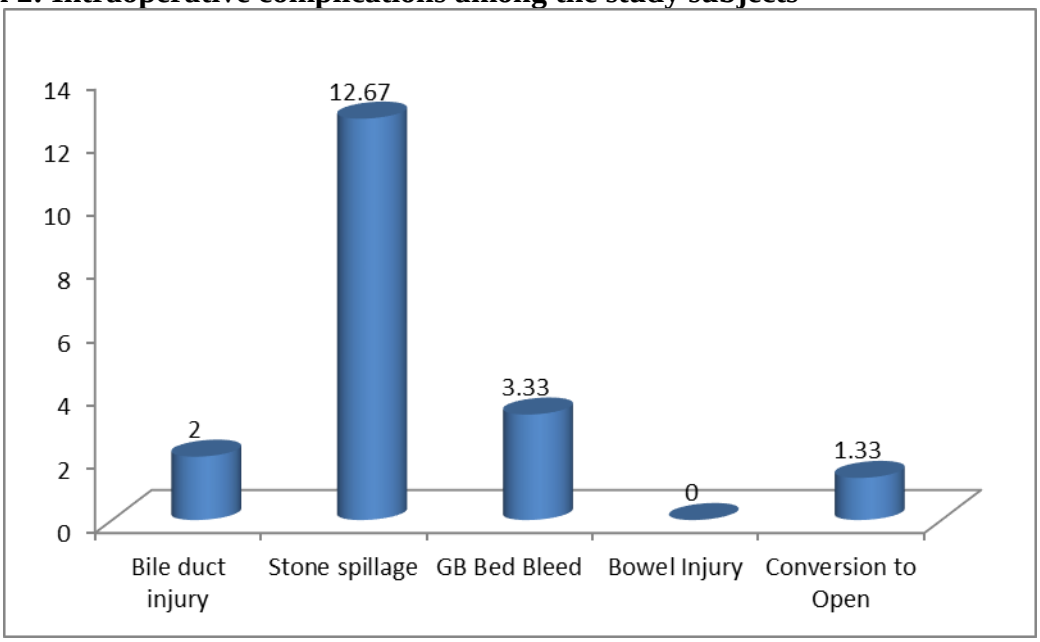
Graph 2: Intraoperative complications among the study subjects



Mean operation time (in min)among the study subjects was 62.89±6.41. Blood loss <50ml and>50ml was reported among 89.33% and 10.67% of the subjects respectively. Mean post-op pain (hours), duration of hospital stay (days) and return to work (days) among the study subjects was 17.08±3.19, 2.01±0.17 and 2.98±0.39 respectively (table 3).

Table 3: Post-operative parameters among the study subjects

Parameters	Laparoscopic Cholecystectomy	
	Mean	SD
Post- op pain (hours)	17.08	3.19
Duration of hospital stay (days)	2.01	0.17
Return to work (days)	2.98	0.39

Wound infection, abdominal infection, postoperative ileus, pulmonary complications and fever was found among 3.33%, 2%, 5.33%, 4% and 4% of the subjects respectively. Port site sinus was not found in any of the subject (table 4).

Table 4: Post-operative complications among the study subjects

Complications	Laparoscopic Cholecystectomy	
	N	%
Wound Infection	5	3.33
Abdominal Infection	3	2.00
Postoperative Ileus	8	5.33
Pulmonary Complication	6	4.00
Fever	6	4.00
Port Site Sinus	0	0

Discussion

The present study was conducted in the department of General Surgery among 150 patients fulfilling the inclusion criteria and who underwent laparoscopic cholecystectomy.

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Gender

Females (78.67%) were comparatively more as compared to males (21.33%) in the present study. The reason for the high incidence among females could be that pregnancy and childbirth have a definitive influence on biliary tract disease, acting by causal stasis as well any weight gain and consequent hypercholesterolemia. Another reason may be the effect of female hormones i.e. oestrogen and progesterone, especially progesterone reducing motility of gall bladder to cause stasis leading to gall stone formation.

Similarly M Khanday et al[12] in their study revealed female dominance too.

Muhammad Sajid et al[13] in their study revealed that out of 50 patients operated 46 (92%) were female and 4 (8%) were male.

Dhaigude et al[14] in their study found male: female ratio of 1:1.96 while study by Parambil SM et al revealed male to female ratio of 1:22.

Age

8%, 38.67%, 22%, 17.33% and 14% of the subjects were aged of 21-30, 31-40, 41-50, 51-60 and 61-70 years respectively. Hence maximum subjects were from the age group of 31-40 years followed by 41-50 years.

Similarly M Khandayet al[12] in their study showed that the majority of the patients (88; 62.85%) in their series belonged to the third and fourth decade of life.

Anindita Bhar et al[15] in their study revealed that in Group A 49 (61.25%) patients were in age group of (20 to 40) yrs. and in Group B 43 cases (53.75%) were in the first group i.e. 20 to 40 yrs. These findings were similar to our study.

Dhaigude et al[14] in their study found a mean age of 39.03 yrs. in open and 33.13 in laparoscopic cholecystectomy.

However, Anmol N et al[16] in their study reported that highest age incidence was in the 5th decade.

USG Findings

USG findings revealed single and multiple stone among 74.67% and 25.33% of the subjects respectively. Distended GB with USG Murphy's sign and edema of the gallbladder was reported among all the subjects. Pericholecystic fluid, mucocele and empyema GB was revealed among 24.67%, 9.33% and 10.67% of the subjects respectively in our study.

These findings are in accordance to that of Lo et al.[2] who reported that in their series USG of the abdomen was also used to confirm the diagnosis of acute cholecystitis. USG findings in their patients revealed thickened gallbladder wall in 82%, oedematous gallbladder in 88.8%, distended gallbladder in 96.3%, Murphy's sign in 85%, pericholecystic fluid in 8% and presence of gallstone in 100%. Saleh et al.[17] reported that in their series USG findings of thickening of gallbladder wall, pericholecystic fluid collection, and impacted stone in the gallbladder neck were regarded as sonological features suggestive of acute cholecystitis.

M Khanday et al.[12] in their study showed that gallstones were seen in all patients; stones were multiple in 36 (25.71%) cases and single in 104 (74.28%) cases. Onultrasonography (USG), edema of the gallbladder with wall thickness >4 mm was revealed in 100%. Distended gallbladder with USG Murphy's sign was seen in all cases.

Intraoperative Complications

Bile duct injury, stone spillage and GB bed bleed was found among 2%, 12.67% and 3.33% of the subjects respectively. Out of three subjects with bile injury, one was repaired and other 2 subjects have to undergo open cholecystectomy (1.33%) which is much lower than reported in other studies. Bowel injury was not found in any of the subject in our study.

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Conversion to open cholecystectomy should not be considered a failure. A study done by Shamim et al[18] has reported conversion to open cholecystectomy in 5.06% patients with chroniccholecystitis and 24.39 % patients with acute cholecystitis.
Singh et al.[19] reported in their experience of laparoscopic cholecystectomy for difficult cases, which included patients with acute cholecystitis, a conversion rate of only 0.57%, which is little lower than our study.
Muhammad Afzal et al[20] in their study found that only 10 cases (3.2%) were converted to open cholecystectomy.

Operative Time

Mean operation time (in min) among the study subjects was 62.89±6.41.
Postoperative hospital stay was in accordance with many reported series. Zucker et al[21] reported a mean hospital stay of 3.3 days for the laparoscopic group and 6.8 days for the patients with conversion to open procedure. Rattner et al[3] reported an average postoperative stay of two days in the successfully treated group and 6 days inthe converted group.
Study by Waldner H et al[22] and several other authors reported a mean time of 70 minutes. Doke A. et al.[23] and Jaswant Jain et al.[24] found a shorter duration of surgery in laparoscopic cholecystectomy which was in agreement with our study.
Contrarily, in various studies (e.g. by Porte RJ et al[25] [75 min], a longer duration for laparoscopic cholecystectomy has also been encountered.
This was probably due to surgeons being more conversant with laparoscopic operations (by training, retraining and performing more numbers of laparoscopic surgeries on a daily basis) generally require less time for performing such operations.

Post-Operative Parameters

Mean post-op pain (hours), duration of hospital stay (days) and return to work (days) among the study subjects was 17.08±3.19, 2.01±0.17 and 2.98±0.39 respectively in this study.
The Tokyo guidelines resulted in a significant increase in the performance of early laproscopic cholecystectomy and significantly reduced preoperative and total hospital stay without increasing intra and postoperative complications[13].
Similar to our study, Hardy KJ et al[26] in their study revealed hospital stay of 2±0.2 days in laparoscopic cholecystectomy group (2 ± 0.2 days).
Chan HS et al[27] recorded that laparoscopic cholecystectomy patients require mean post-operative stay of 3.5 days.
Several other authors e.g. Hendolin HI et al.[28] recorded similar findings.

Post-Operative Complications

In the present study; wound infection, abdominal infection, postoperative ileus, pulmonary complications and fever was found among 3.33%, 2%, 5.33%, 4% and 4% of the subjects respectively. Port site sinus was not found in any of the subject.
In a study by Muhammad Afzal et al[20], complication rate was 4.5%.
According to Anindita Bharet al[15], post-operative complication was found among 6.20% of the subjects.
In the Ohta M et al[29] study, nine of the patients (9%)undergoing laparoscopic cholecystectomy, experienced postoperative complications: wound infection in 4 patients, bile leakage in 2 patients, abscess formation at the liver bed in 2 patients and postoperative hemorrhage in 1 patient.
According to Muhammad Sajid et al[13], post operatively, there was bile leak in 1 (2%)patient which was due to minor injury of CBD, which required re-exploration & suturing of defect. There was no major bleed post operatively. 3 (6%) patients developed wound infection.

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M Khanday et al[12] in their study revealed that postoperative complications were pain in 12 (8.57%), fever in 16 (11.42%), basal pneumonitis in 4 (2.85%), biliary fistula in 4 (2.85%) and faecal fistula in 1 (0.71%) of the patients.
Gharaibeh et al.[30] reported a clinically significant bile leak in 0.55%, which was managed by drainage.
Laparoscopic cholecystectomy is the treatment of choice for the majority of patients with gallstone disease with a very low and acceptable conversion rate which was only 1.33% in our series. Laparoscopic cholecystectomy became an established procedure due to less pain, shortened postoperative hospitalization and minimum morbidity and early return to home. During the initial phase, many surgeons performed randomized studies to evaluate laparoscopic cholecystectomy versus open procedure. This is no longer a matter for discussion and laparoscopic cholecystectomy is now the procedure of choice for treating gallbladder stones.
Hence, we recommend that laparoscopic cholecystectomy can be done safely and successfully within 72 hours of presentation. There is no benefit to attempting to "cool off" the gallbladder. The message remains the same for acute cholecystitis: "get it while it is hot".

Conclusion

Laparoscopic cholecystectomy is an effective and safe technique of treating symptomatic gallstones even in cases of acute cholecystitis because of accelerated recovery coupled with less postoperative pain and short hospital stay & early return to work. Early cholecystectomy should be adopted as it reduces the risk of complications and decreases the economic burden on patient and hospital resources.

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